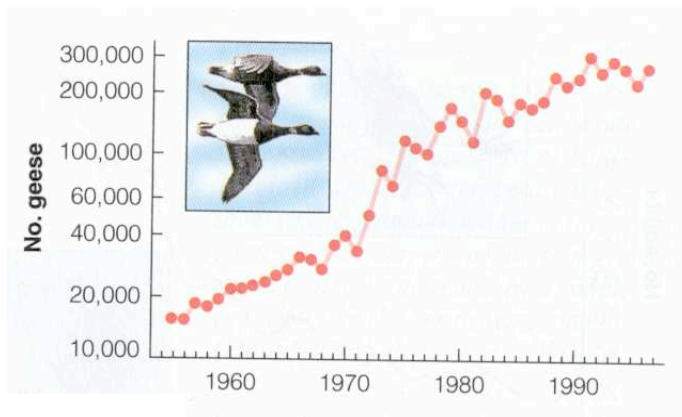


1. The population of geese shown in the graph below has reached its carrying capacity. Account for the factors that cause the numbers in the population to fluctuate even after reaching carrying capacity.



2. As a population biologist, you are studying a population of wild tree squirrels. To determine the size of the population, you first tag 400 squirrels. You then release the squirrels. 2 weeks later, you return and capture another 400 squirrels. Of these 400, 125 are tagged while the rest are untagged. Using this information, determine the actual size of the tree squirrel population. Show your work.

3. As a park ranger for the National Park Services, you are monitoring the population of the bison at Yellowstone National Park. According to previously recorded data in 1990, the carrying capacity of the bison was 12,000 bison. After taking some data of your own, you find that the carrying capacity has dropped to 8,500 bison. What are some reasons that the carrying capacity would drop? What are some reasons that the carrying capacity would increase?

Reasons for Drop:

Reasons for Increase:

4. Exponential growth is one of the models used to describe population growth. Why is it theoretically impossible for a population to exhibit only exponential growth?

5. Energy is transferred from one trophic level to the next with varying degrees of efficiency. Inevitably, not all of the energy that is produced can be passed on to the next level. Which of these organisms, a fish or a mammal, would be more efficient at passing on energy to the next trophic level? Explain why.

6. The acacia tree is native to North America, however it is now found all over the world. The leaves of the acacia tree contain many acidic compounds. Acacia trees make good firewood, so they are used by forestry departments worldwide as a source of lumber. What effect could acacia trees have on the surrounding environment if they are planted in a region in which they are not native?

7. Mercury is introduced into ocean water through emissions from factory smokestacks then converted by bacteria into a form that is easily absorbed by insects and small sea organisms. Recently, the FDA has become concerned about the levels of mercury in large fish such as swordfish and tuna—it has reached levels that are unsafe for human consumption. Explain how the levels of mercury got so concentrated in these large fish.

8. Biomass is defined as the total weight of all the living organisms in a particular area. Over the course of 4 years, scientists measure the biomass of Lake Erie in Michigan. During year 2, a new golf course is built nearby which results in a great deal of fertilizer runoff into the lake. Explain the drastic changes in biomass over the course of these 4 years (Hint: algae in lakes like fertilizer too... think about how algae population could affect other populations in the lake) Remember that you need to explain both the initial increase in biomass and the eventual decline.

Year	Biomass (g)
1	246
2	800
3	160
4	45